Diversification
and
Statute Implementation of CR

Donald CHAO, Chairman

CR Classification Society

2017.5.23

CR Overview

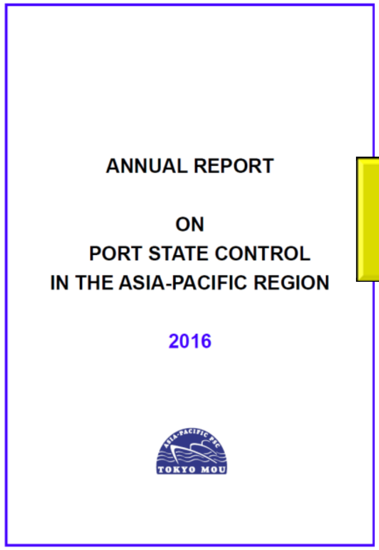
CR Classification Society 1951
CR
財團法人中國驗船中心
CR Classification Society

- Founded in 1951
- Headquarters in Taipei
- 5 branch offices:

  Kaohsiung, Japan, China, Singapore and South Africa
- Authorized by 8 flag States: Taiwan, Panama, Belize…
- ISO 9001 quality management system since 1995
- 108 employees in Taiwan, including 9 doctors and 51 masters
- Classes 386 ships totaling 4,523,000 GT

RO Performance in Tokyo MOU

- Ranked 12 out of 83
- 23 in High Performance



ANNUAL REPORT

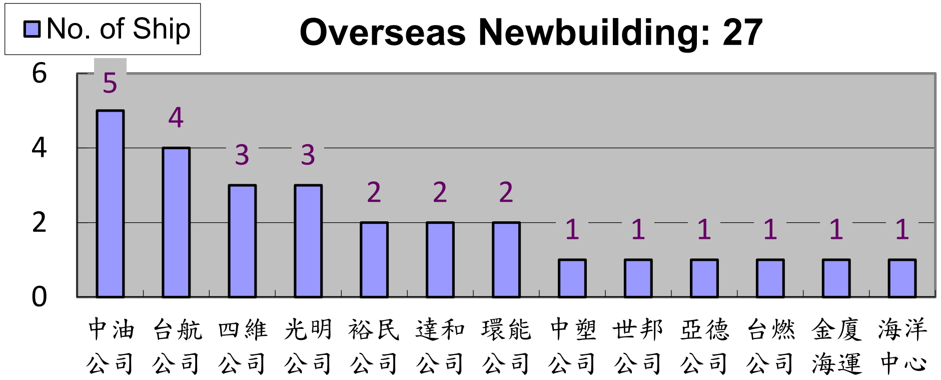
ON
PORT STATE CONTROL
IN THE ASIA-PACIFIC REGION

2016

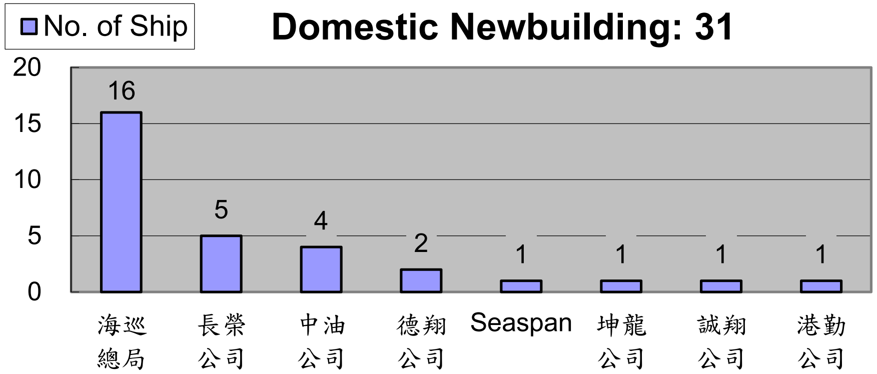
Rank	Recognized Organization (RO)	Performance Level
1	China Classification Society (CCS)	High Performance
2	RINA Services (RINA)	
3	Korean Register of Shipping (KR)	
4	Lloyd's Register (LR)	
5	DNV GL AS (DNV-GL)	
12	CR Classification Society (CR)	
23	International Ship Classification	
24~	…………	Medium
~83	…………	Low

Ship Statistics

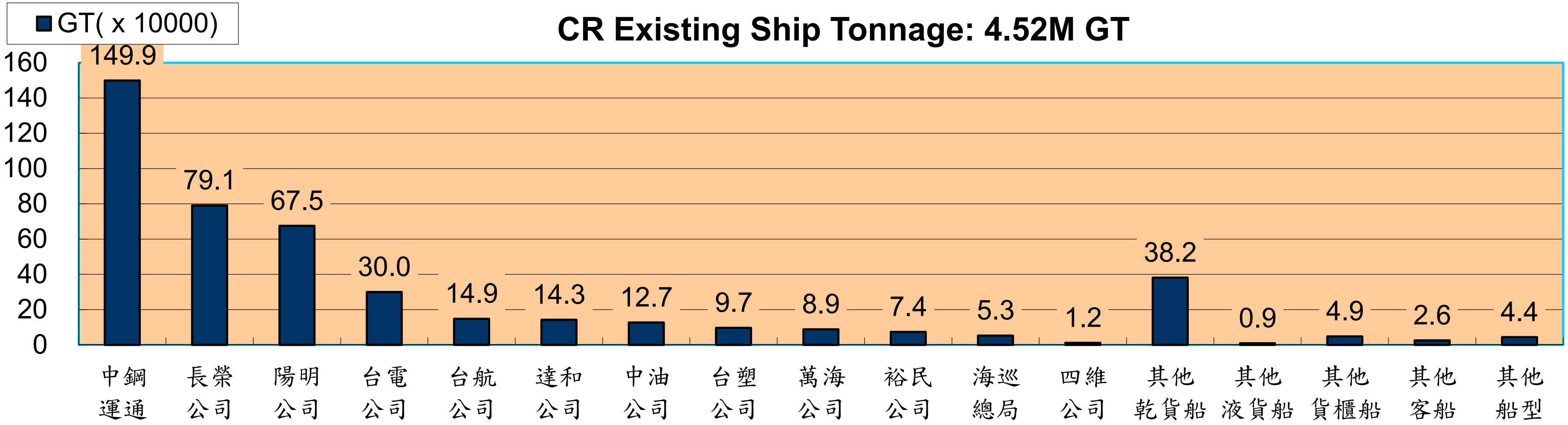
Overseas Newbuilding: 27



Domestic Newbuilding: 31

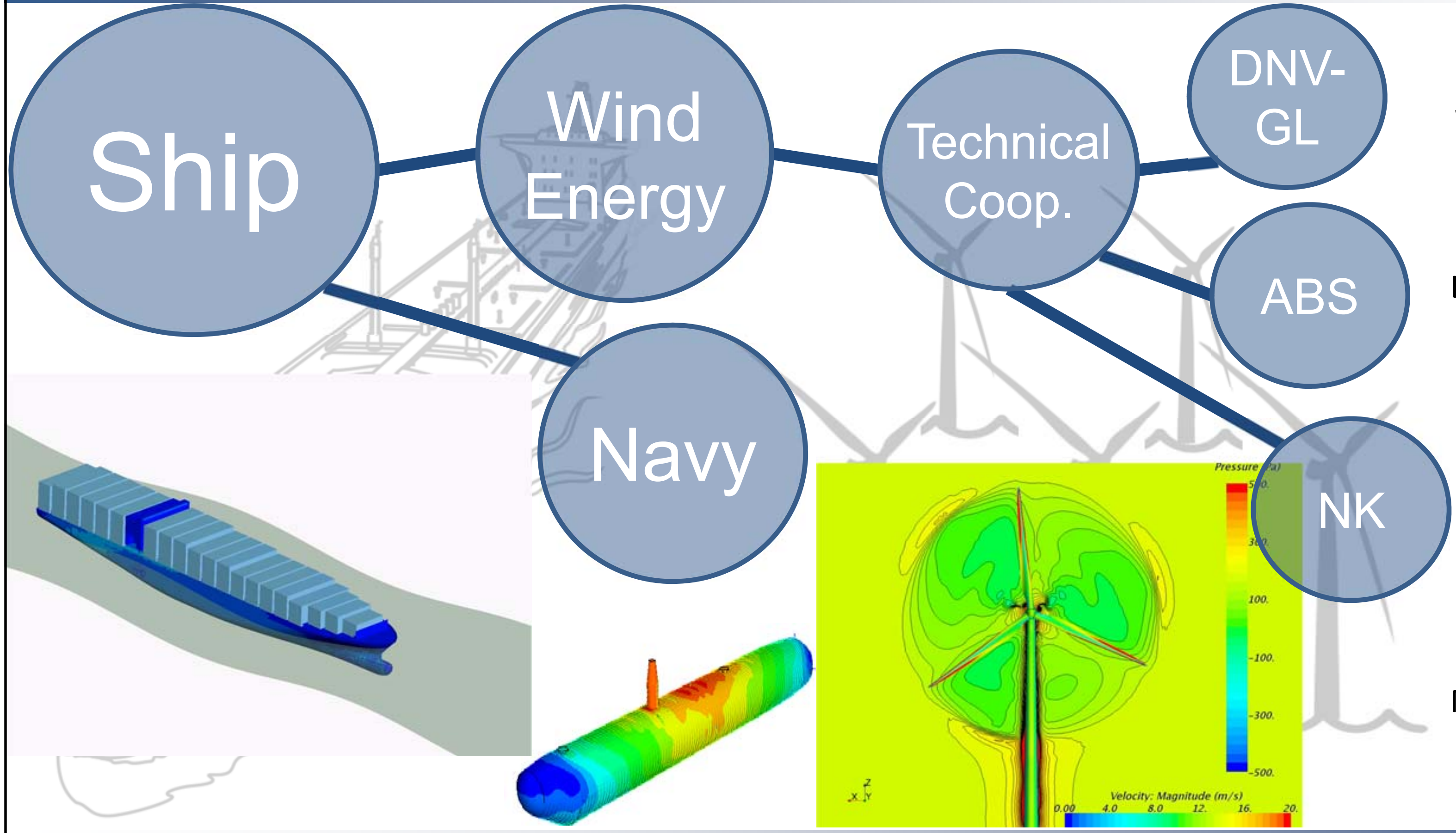


CR Existing Ship Tonnage: 4.52M GT



2012 Diversification

From Ship To Wind And Others



Ship

Wind Energy

Technical Coop.

DNV-GL

ABS

NK

Navy

Pressure (Pa)
500.
300.
100.
-100.
-300.
-500.
Velocity: Magnitude (m/s)
0.00
4.0
8.0
12.
16.
20.
Z
X
Y

Milestone

2012.11 - 2014.12
Wind Training by DNV

2013.04 - 2014.12
Wind Training by GL

2013.12
Licensing for AWS CWI

2014.05
Met mast survey with DNV-GL

2014.08 - 2015.05
ICP MODU Training by ABS

2015.03
R&D Coop. with NK

2015.10
MWS Coop. with CSBC

2016.05
BSMI team

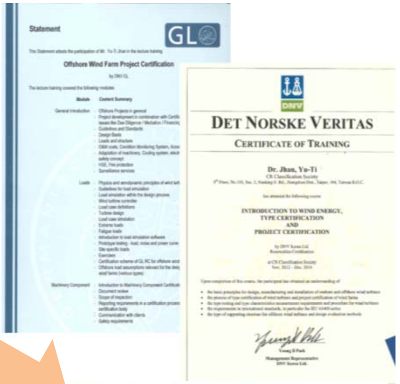
International Technical Cooperation

2012~2015 DNV-GL + 2014~2015 ABS + 2015~2016 NK

1.load-out

2.transportation

3.self-elevation


Statement

Offshore Wind Farm Project Certification

by DNV GL

DET NORSKE VERITAS

CERTIFICATE OF TRAINING

Dr. Jhan, Yu-Ti

CR Classification Society

INTRODUCTION TO WIND ENERGY,
TYPE CERTIFICATION
AND
PROJECT CERTIFICATION

4.piling

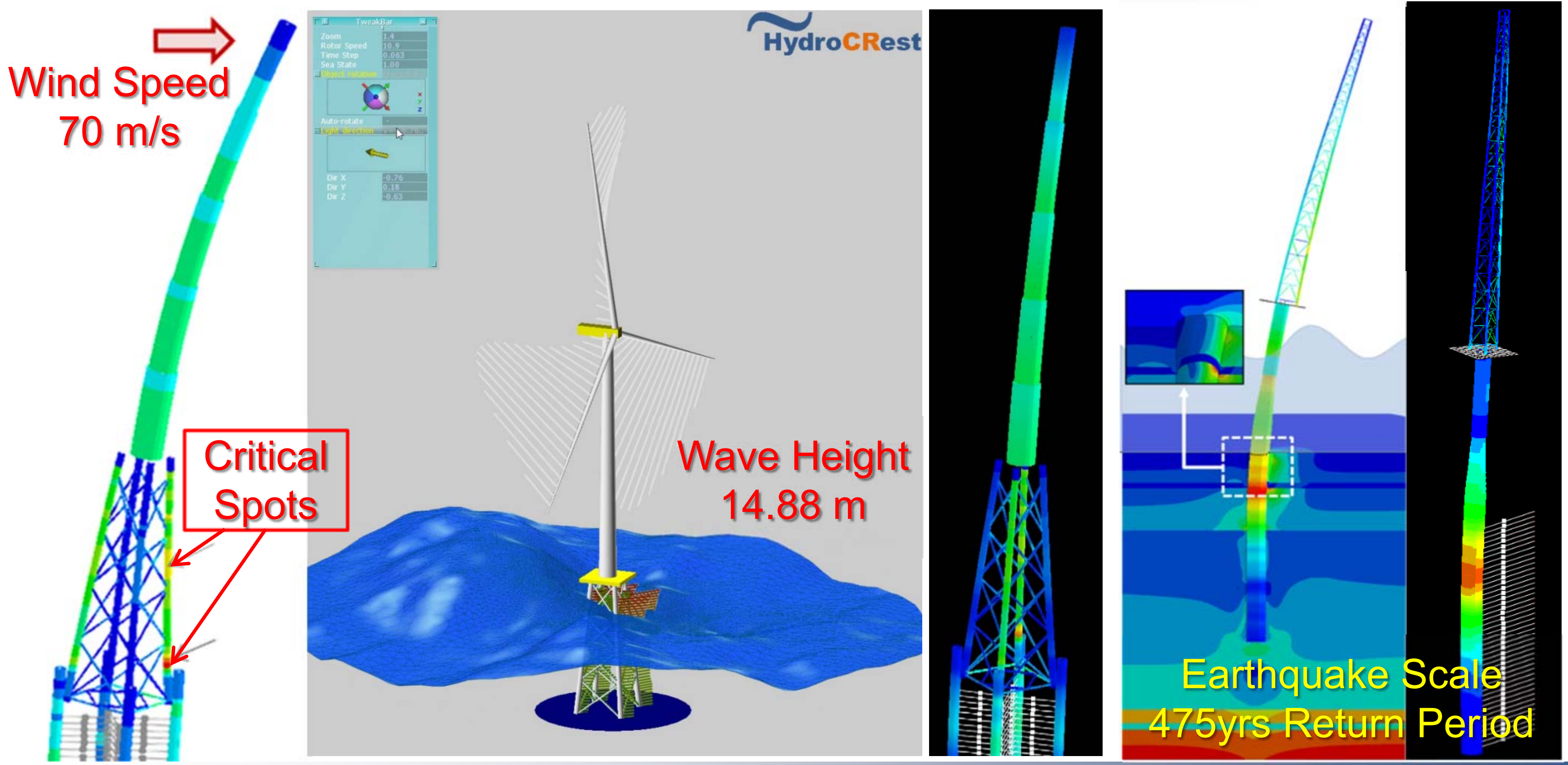
5.lifting

6.grouting

7.lifting

8.finish

2015 Ultimate Strength under Typhoon and Earthquake


HydroCRest
TweakBar
Zoom 1.4
Rotor Speed 10.9
Time Step 0.063
Sea State 1.00
Auto-rotate
Dir X -0.76
Dir Y 0.18
Dir Z -0.63

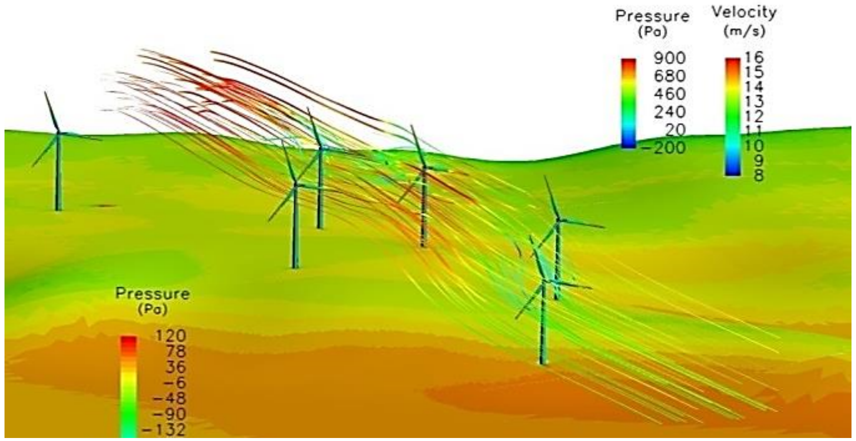
Wind Speed 70 m/s

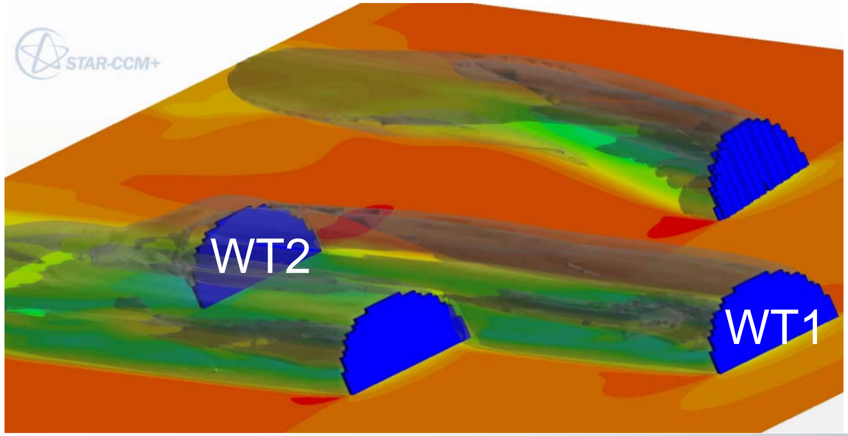
Critical Spots

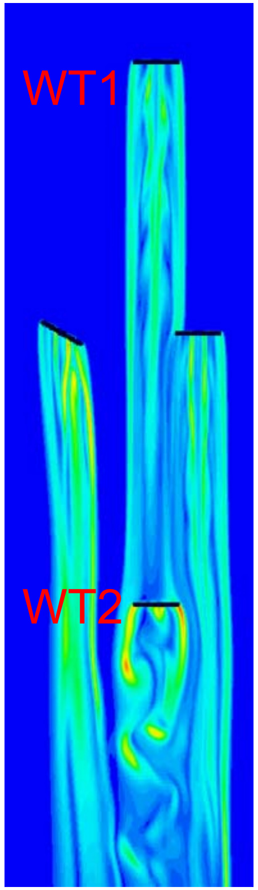
Wave Height 14.88 m

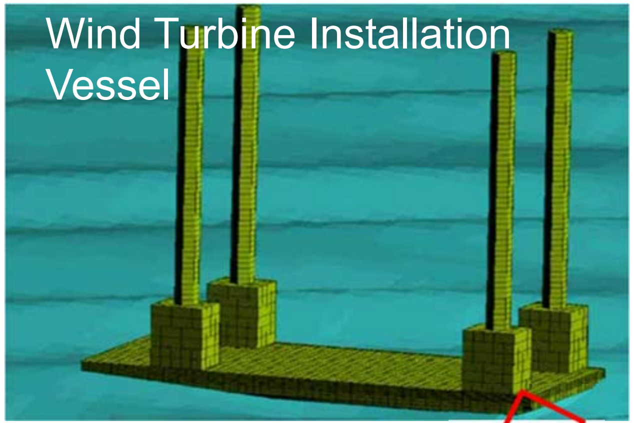
Earthquake Scale 475yrs Return Period

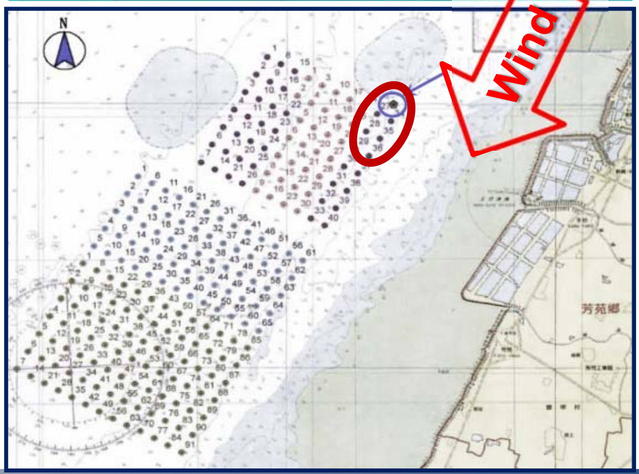
2016 Offshore Wind Turbine Array


Pressure (Pa)
900
680
460
240
20
-200
Velocity (m/s)
16
15
14
13
12
11
10
9
8
Pressure (Pa)
120
78
36
-6
-48
-90
-132


STAR-CCM+
WT2
WT1

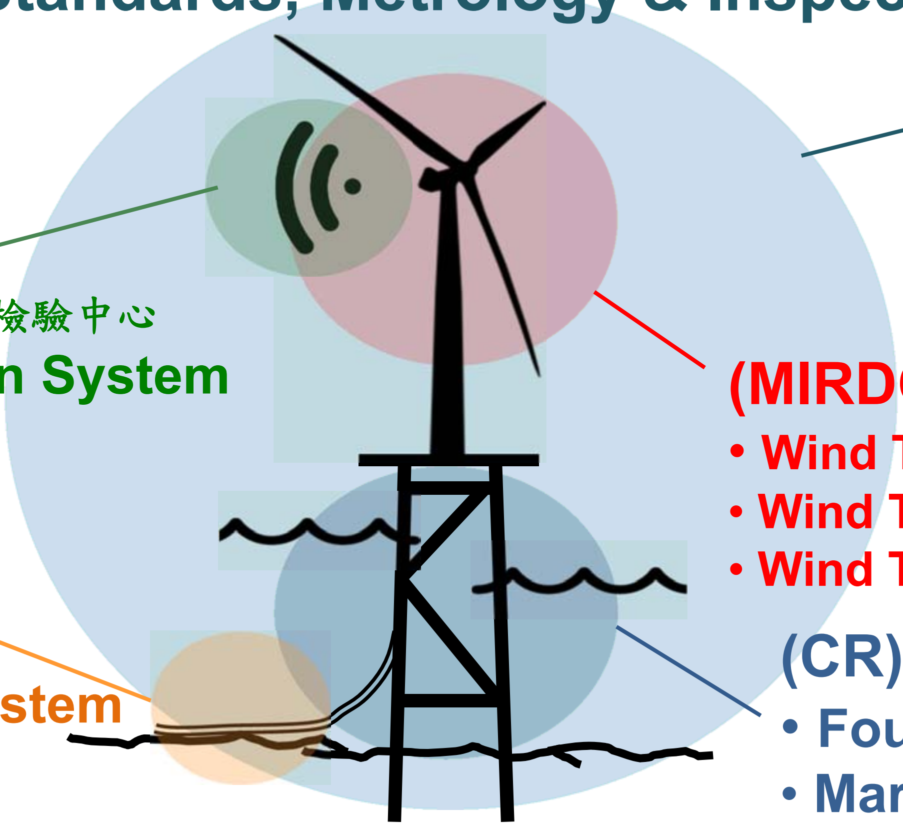



Wind Turbine Installation Vessel



2016-2017 BSMI Technical Team

Bureau of Standards, Metrology & Inspection (BSMI) 標準檢驗局



- **(ETC)台灣電子檢驗中心**
Communication System

台灣大電力
- **(TERTEC)**
Power Grid System

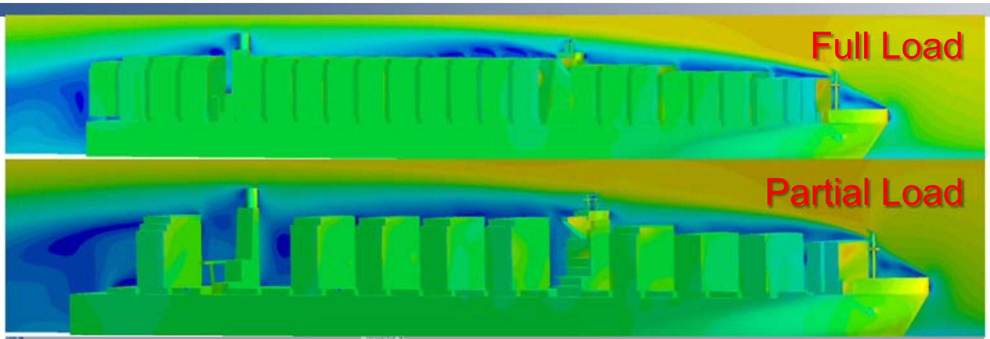
(TIER) 台灣經濟研究院
- **Finance & Insurance**
- **Policy & Marketing**

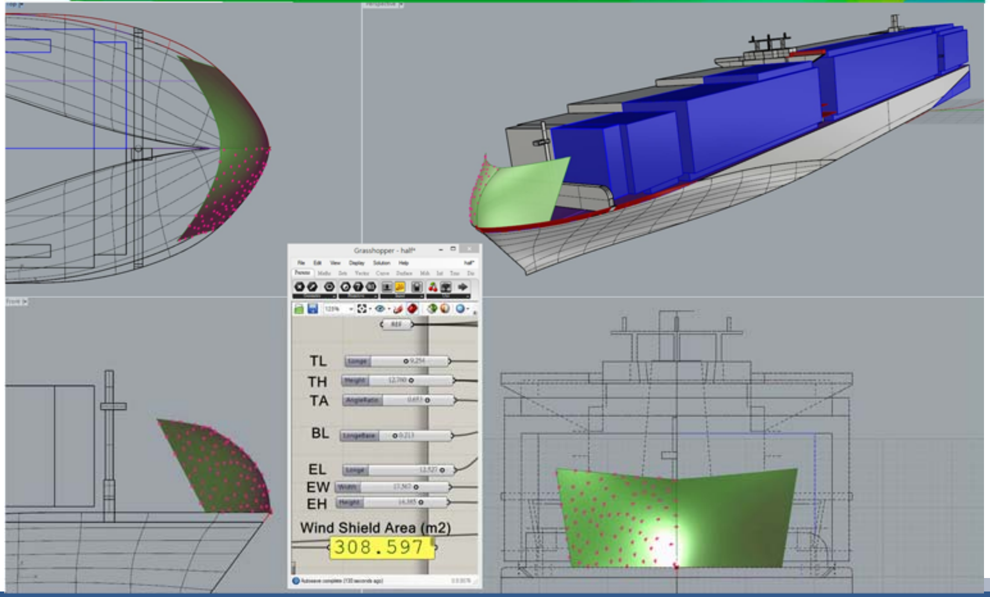
(TAF) 全國認證基金會
- **Accreditation**

(MIRDC) 金屬工業中心
- **Wind Turbine Verification**
- **Wind Turbine Manufacturing**
- **Wind Turbine Testing**

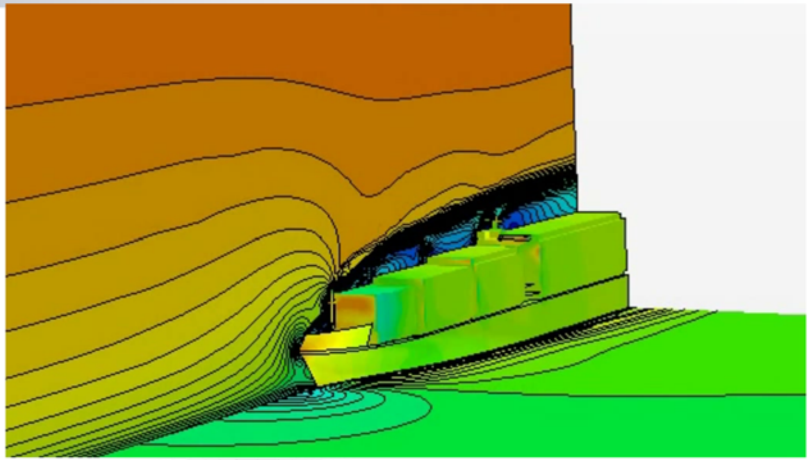
(CR) 中國驗船中心
- **Foundation Verification**
- **Marine Operation**

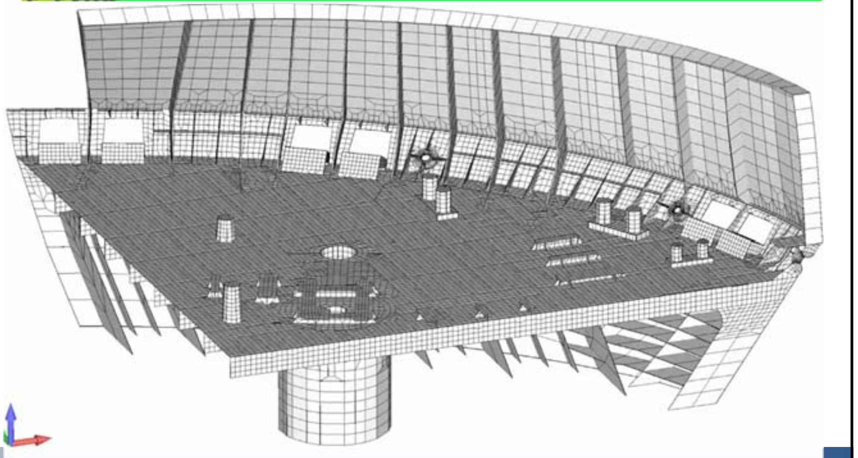
CR-CSBC Windshield for Container Ship -10% to Wind Resistance


Full Load
Partial Load


Grasshopper - hal*
TL
TH
TA
BL
EL
EW
EH

Wind Shield Area (m2) 308.597





Statute Implementation

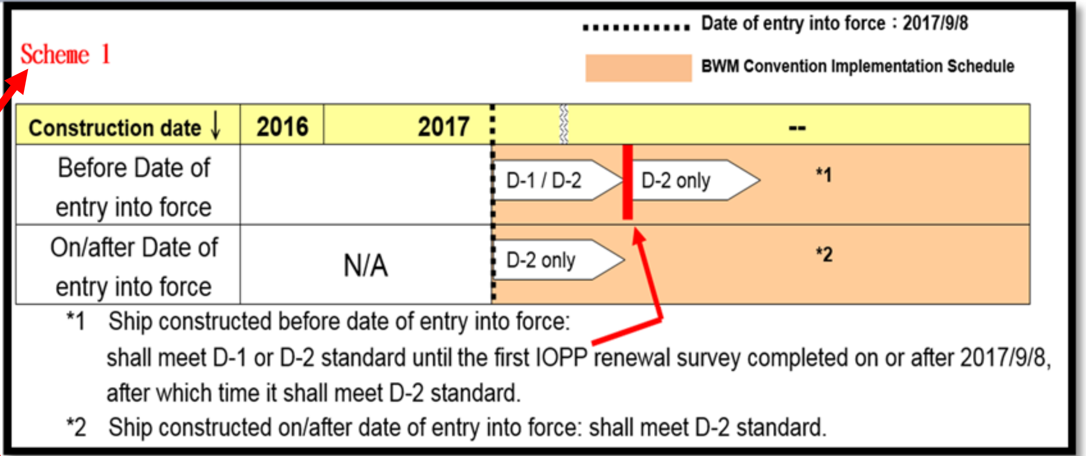
Ballast Water Management

BWM Convention Implementation Schedule

MEPC 71 (2017/7) will make the final decision.

De-harmonization of the IOPP Renewal Survey

Some flag states allow IOPP renewal survey may be conducted independently：Taiwan, Liberia, Panama, etc.



Scheme 1

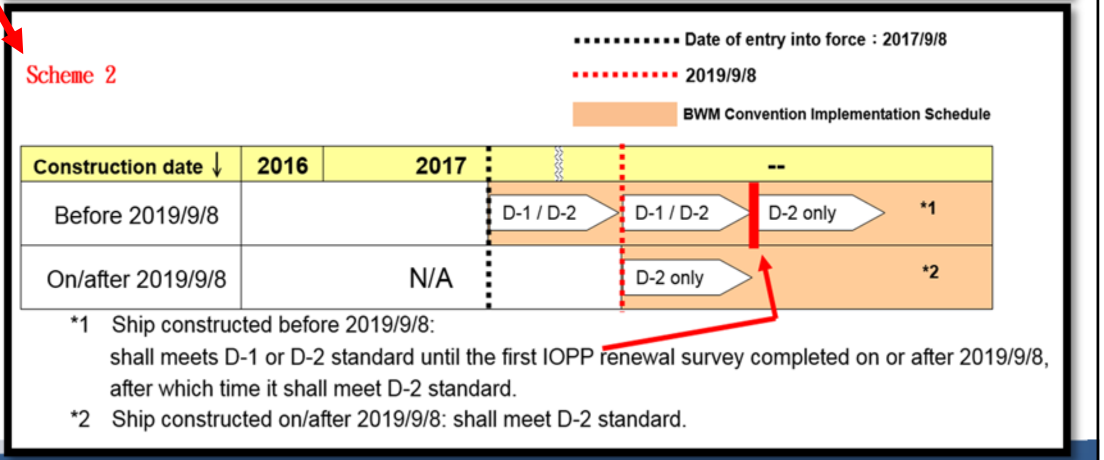
Date of entry into force：2017/9/8

BWM Convention Implementation Schedule

Construction date ↓	2016	2017	--	
Before Date of entry into force			D-1 / D-2 D-2 only	*1
On/after Date of entry into force	N/A		D-2 only	*2

*1 Ship constructed before date of entry into force:
shall meet D-1 or D-2 standard until the first IOPP renewal survey completed on or after 2017/9/8, after which time it shall meet D-2 standard.

*2 Ship constructed on/after date of entry into force: shall meet D-2 standard.



Scheme 2

Date of entry into force：2017/9/8

2019/9/8

BWM Convention Implementation Schedule

Construction date ↓	2016	2017	--	
Before 2019/9/8			D-1 / D-2 D-1 / D-2 D-2 only	*1
On/after 2019/9/8	N/A		D-2 only	*2

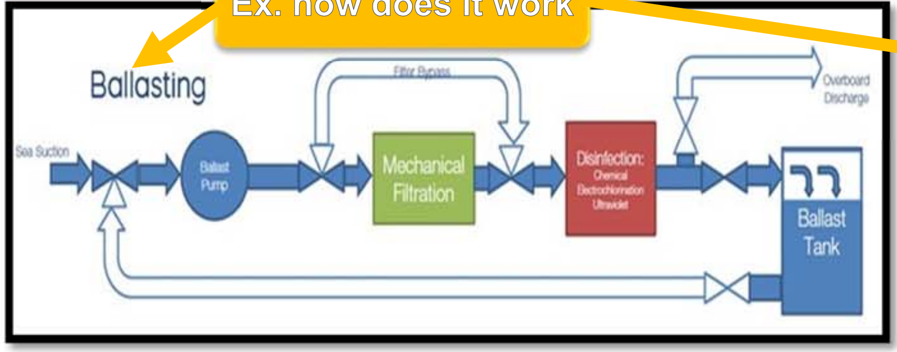
*1 Ship constructed before 2019/9/8:
shall meets D-1 or D-2 standard until the first IOPP renewal survey completed on or after 2019/9/8, after which time it shall meet D-2 standard.

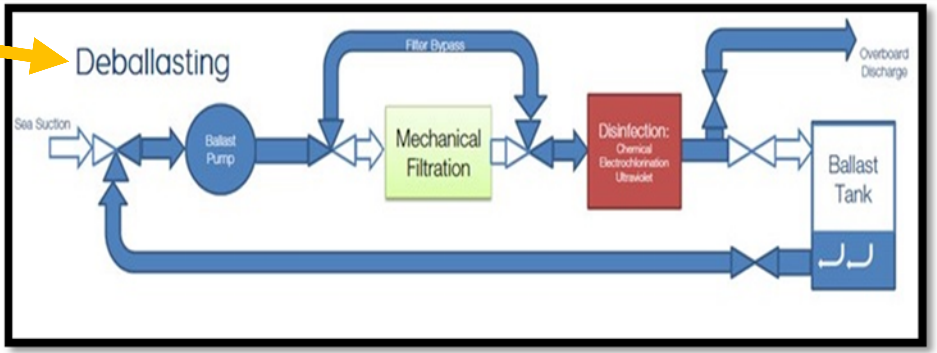
*2 Ship constructed on/after 2019/9/8: shall meet D-2 standard.

How Ballast Water Treatment Works?

Methods of ballast water treatment		
Mechanical	Filtration	Removal of sediments, larges particles or organisms by membranes, disks, screens or magnets
Physical	Ultraviolet (UV) irradiation	UV radiation attacking and breaking the cell membrane killing or sterilizing organisms
Chemical	Biocide injection	Chemical biocides injection (chlorine, chlorine ions, chlorine dioxide, sodium hypochlorite, etc.) killing organisms by poisoning
Chemical	Electrochemical	Electrolysis: generation of free chlorine sodium hypochlorite, causing electrochemical oxidation to kill organism

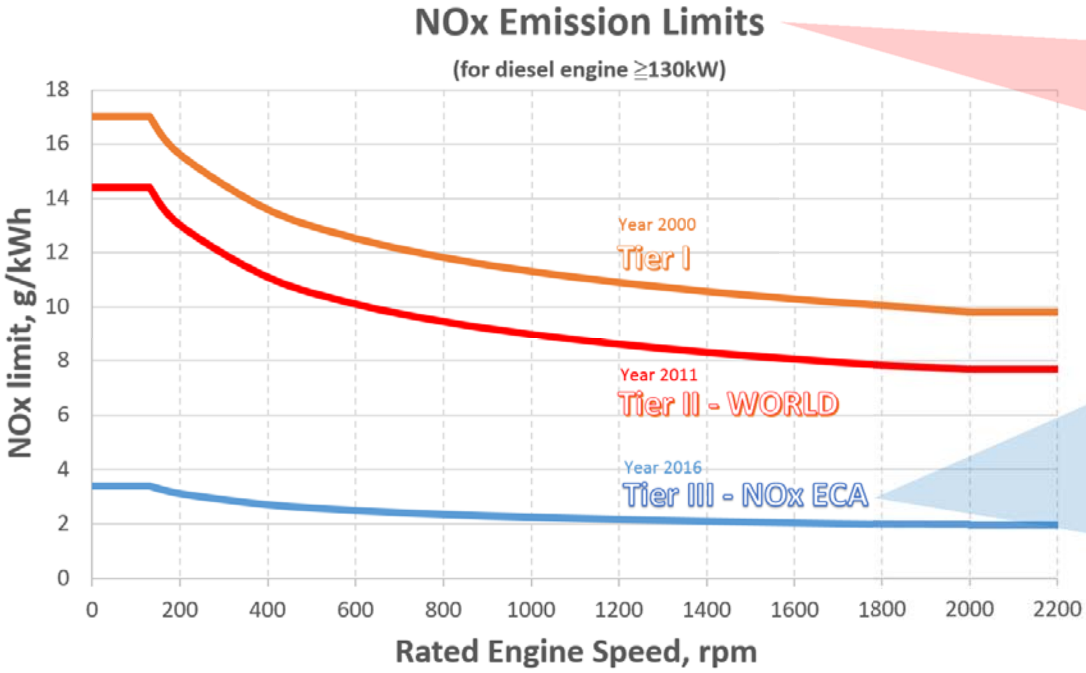
Ex. how does it work


Ballasting
Filter Bypass
Overboard Discharge
Sea Suction
Ballast Pump
Mechanical Filtration
Disinfection: Chemical Electrochlorination Ultraviolet
Ballast Tank


Deballasting
Filter Bypass
Overboard Discharge
Sea Suction
Ballast Pump
Mechanical Filtration
Disinfection: Chemical Electrochlorination Ultraviolet
Ballast Tank

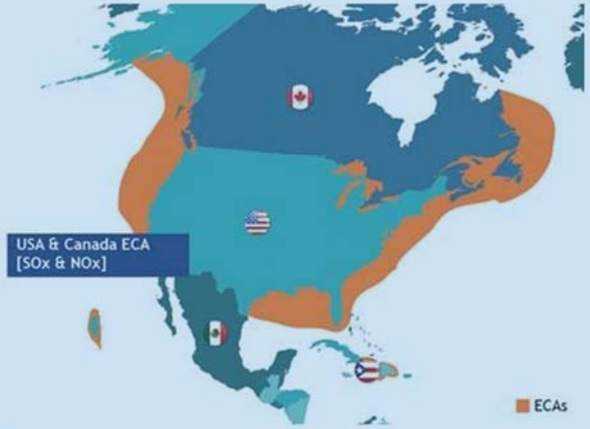
Figures source: http://www.nepia.com/insights/ballast-water-management/the-challenges/

MARPOL Annex VI – Regulation 13 Nitrogen Oxides (NOx)



Tier	Ship Construction Date	NOx Limit, g/kWh n = engine's rated speed(rpm)		
		n < 130	130 ≤ n < 2000	n ≥ 2000
I	2000	17	$45 \cdot n^{-0.2}$	9.8
II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
III	2016	3.4	$9 \cdot n^{-0.2}$	2

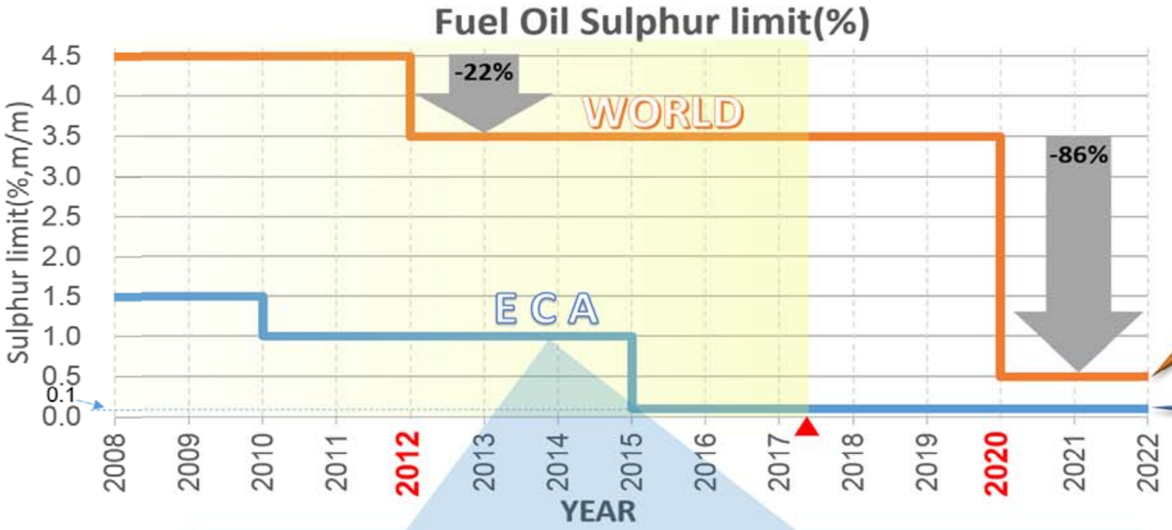
ECA (for NOx)：
North American area
United States Caribbean sea area



Figures source：http://www.gulf-marine.com/service/technical_detail/11

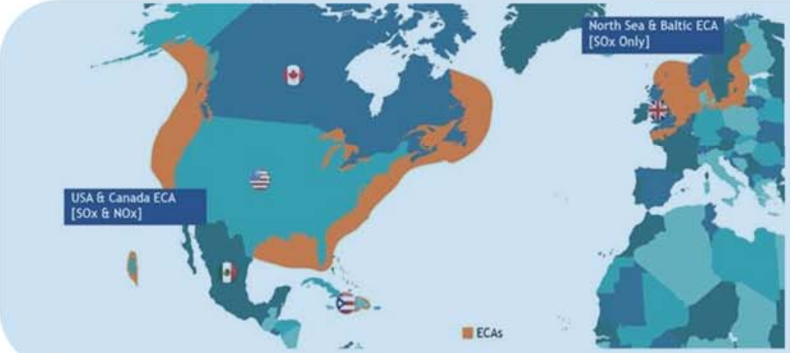
All CR classed ship should comply with the requirement of MARPOL Annex VI Reg.13 and NOx Technical Code

MARPOL Annex VI – Regulation 14
Sulphur Oxides (SOx)



Global 0.5% Sulphur limit was confirmed to apply from 2020/1/1.

Inside ECA: 0.1%


North Sea & Baltic ECA
[SOx Only]
USA & Canada ECA
[SOx & NOx]
ECAs

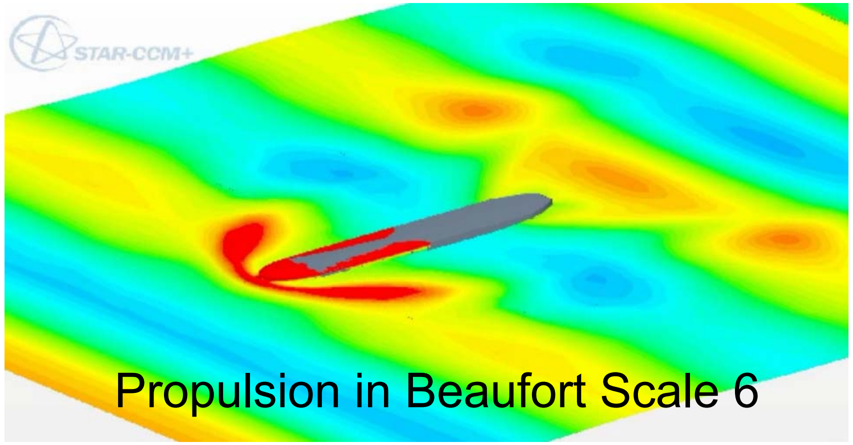
ECA (for SOx)：
Baltic Sea area
North Sea
North American area
United States Caribbean Sea area

Figures source ：http://www.gulf-marine.com/service/technical_detail/11

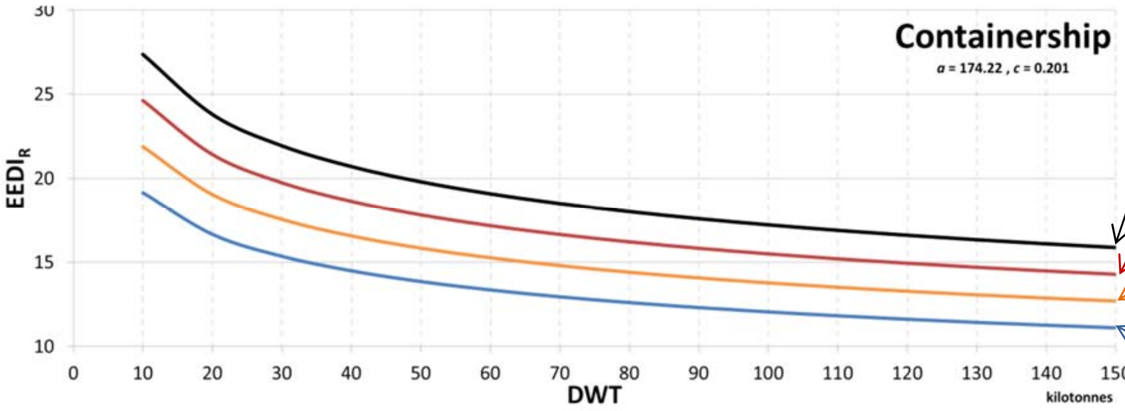
MARPOL Annex VI – Chapter 4
Energy Efficiency Design Index (EEDI)

- **CResta** program (**CR** Electronic Sea Trial Analysis) calculates sea trial data and ships' EEDI$_A$

$$\mathrm{EEDI_A} = \frac{\mathrm{CO_2\ emission}\begin{pmatrix} +\ 1.\ \text{Main engine} \\ +\ 2.\ \text{Auxiliary engine} \\ +\ 3.\ \text{Power take in} \\ -\ 4.\ \text{Power take off} \\ -\ 5.\ \text{Power saving device} \end{pmatrix}}{f_i \cdot f_c \cdot f_l \cdot \text{Capacity} \cdot f_w \cdot V_{ref}}$$



Propulsion in Beaufort Scale 6



Phase 0 : 2013 – 2014
Phase I -10% : 2015 – 2019
Phase II -20% : 2020 – 2024
Phase III-30% : 2025 –

THE END

http://www.crclass.org/

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donaldchao@crclass.org